# Chlorine Partitioning in the Arctic Vortex during Winter 1995 Derived from Submillimeterwave Remote Sensing and in situ Constituent Measurements.

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I I igh altitude balloon nights of a combined pa yload of the Submillmeterwave Limb Sounder (Jet Propulsion Laboratory) and the whole air sampler (Institute for Stratospheric Chemistry) instruments were performed on 27 January 1995 and 08 March 1995. Both flights were launched from the ESRANGE launch facility at Kiruna, Sweden (68°N, 21°E) as part of SESAME, the Second Europea n Stra tospheric Arctic and Mid-latitude Experiment. The Submillimeterwave Limb Sounder (S[.S) is a heterodyne radiometer/spectrometer that measures limb thermal emission spectra bands near 600 G] Iz while the balloon is at float (ceiling) altitude. Spectra measured at several observation angles are deconvolved using a radiative transfer model to infer constituent ab undance. The whole air sampler collects flask samples at several altit udes during balloon ascent and descent that are subsequently analyzed using gas chromatography. Vertical abundance profiles from 35 to 10 km of several key reactive and long-lived atmospheric trace constituents were measu red including ClO, 03, I] Cl, i INO3, N20 and CF2Cl2. The first of these flights on '27 Jan sampled air within vor tex as indicated both by the N 2 0 measurements showing strong air mass descent and the E CMWF analysis. The SLS field of view was directed toward a cold center (< 193K on the. 450K surface) to the east of Kiruna. Measured ClO peak abundance was 1.6 ppbv at 20 km while HCl was below the detection limit (~100 pptv) at that altitude. These data combined with estimates of total and organic chlorine derived from **N20** profiles indicate that most of the available chlorine had been converted to ClOx in the observed air par cel. The second flight on 08 March 1995 sampled warmer air outside the polar vortex. 1 ong lived t racer profiles were indicative of midlatitude air. ClO was below 100 pptv at 20 km while 1 ICl abundance was 800 pptv at this altitude.